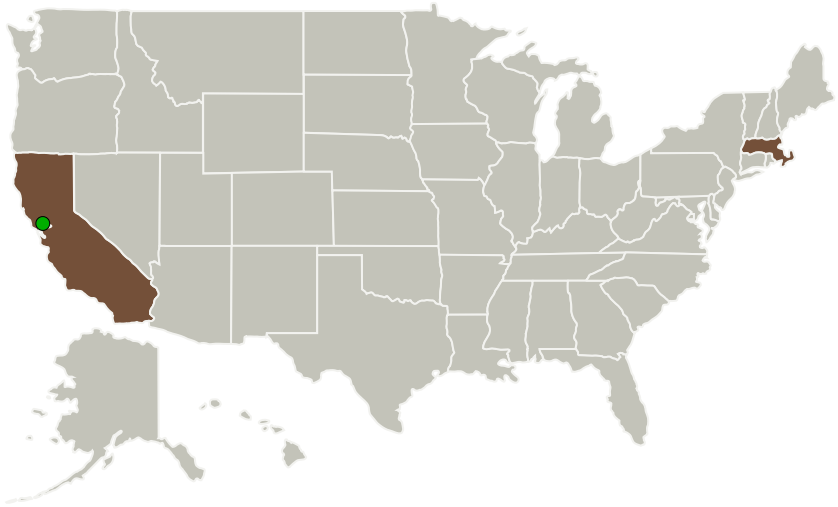
Ablative Flexible Aerogel TPS Materials for Mars Aerocapture and Entry, Phase I

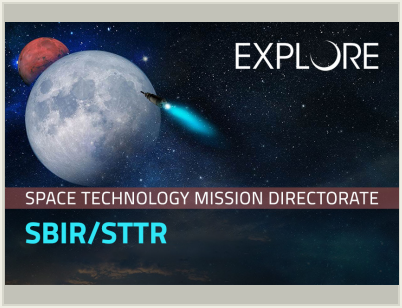
Completed Technology Project (2011 - 2011)

Project Introduction

Renewed interest in missions to explore other planets has created a need for new advanced heat shield systems that will protect spacecraft from the severe heating encountered during hypersonic flight through planetary atmospheres. Both reusable and ablative TPS have been developed to protect spacecraft. Typically, reusable TPS have been used for the Shuttle where the reentry conditions are relatively mild while ablative TPS materials have been used on planetary entry probes where high heating rates are generated. Additional advances in TPS design are needed to deliver large payloads to the moon and Mars, and to explore the outer planets. Flexible or deployable aeroshells offer an approach for achieving larger aeroshell surface areas for entry vehicles than otherwise attainable without deployment. Larger surface area aeroshells offer the ability to decelerate high-mass entry vehicles at relatively low ballistic coefficients. However, for an aeroshell to perform even at the low ballistic coefficients attainable with deployable aeroshells, a flexible thermal protection system (TPS) is required that is capable of surviving reasonably high heat flux and durable enough to survive the rigors of construction, handling, and deployment. Aspen Aerogels proposes to develop ablative flexible reinforced aerogels to meet this challenge.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Aspen Aerogels, Inc.	Lead Organization	Industry	Northborough, Massachusetts
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137938)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Aspen Aerogels, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

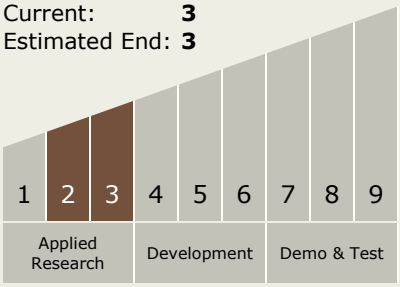
Carlos Torrez

Principal Investigator:

Wendell Rhine

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.1 Aeroassist and Atmospheric Entry
    - TX09.1.1 Thermal Protection Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System